INSTRUCTION BOOK FOR

BIRD

Series 8000

Termaline® Coaxial Load Resistor

LIMITED WARRANTY

We are proud of the high quality of our product and we warrant to the original purchaser that each new instrument of our manufacture will for a period of one year after original shipment be free from defects in material and workmanship under normal and proper operating conditions and that properly used during such period it will perform in accordance with our applicable specifications.

Our obligation and the purchaser's exclusive remedy for any defect or failure to meet specifications shall be limited, at our option, to repair or replacement or, if we determine said defect or failure to be so defective as to preclude remedying by repair or replacement, the purchaser's sole and exclusive remedy shall be limited to refund of the purchase price. We shall have no obligation if defects result from improper use, operation above rated capacities, repairs not made by us, or misapplication of the equipment. Our warranty does not extend to the failure of semiconductor devices and batteries, or to equipment and parts made by others except to the extent of the original manufacturer's warranty to us. No other warranty is expressed or implied. Bird Electronic Corporation is not liable for consequential damages.

Warranty returns must be first authorized by the factory office and are to be shipped prepaid.

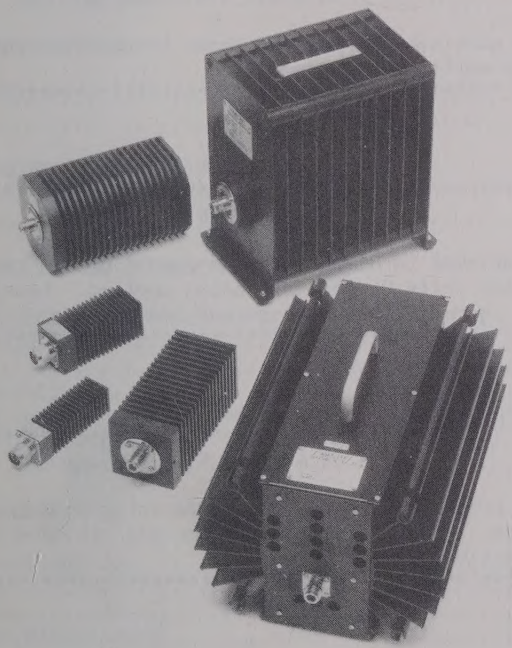
MODELS COVERED IN THIS INSTRUCTION BOOK

8080	8164	8173
8085	8166	8431

INSTRUCTION BOOK

Series 8000

Termaline® Coaxial Load Resistor



BIRD

Electronic Corporation

30303 Aurora Road, Cleveland (Solon) Ohio 44139-2794

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* C A U T I O N *
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* Do not continuously operate these loads above their *
* maximum wattage ratings. *
****

****
* W A R N I N G *
*
* Never attempt to disconnect the load from the transmis- *
* sion line while RF power is being applied. Leaking RF *
* energy is definitely a dangerous health hazard. *
****

****
* W A R N I N G *
*
* Do not attempt to remove the RF resistor from inside *
* the load. Potentially toxic materials are used in its *
* construction. *
****

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INTRODUCTION

PURPOSE AND FUNCTION

These devices are portable, general purpose 50 ohm coaxial transmission line terminations. They are self-contained units, liquid free and air cooled, requiring no outside power source or additional equipment. They provide accurate, dependable, and practically nonreflective terminations for testing and adjusting transmitters under nonradiating conditions. These loads are useful for the following purposes:

a. As a substitute antenna.

   1. For tuning transmitters under nonradiating conditions.

   2. For making routine tests and adjustments.

b. As a substitute for any circuit loading element.

c. To measure, with a suitable indicating device, the power output of any coaxially transmitted signal within their rating.

PERFORMANCE CHARACTERISTICS AND CAPABILITIES

Series 8000 dry loads can absorb their individual maximum rated RF power levels continuously and dissipate them harmlessly as heat over their entire frequency range. Because they are dry, they are attitude insensitive and can therefore, be used in any position. Consult the Specification Sheet, Page vi for a listing of their individual power ratings, frequency ranges and VSWR values.

DIMENSIONS AND WEIGHT

Consult the Specification Sheet on Page vi for the size and weight of each load.

POWER AND UTILITY REQUIRMENTS

These loads are passive devices that are self-contained and do not need any external source of power or utility to function.

ENVIRONMENTAL REQUIREMENTS

These loads should be operated in a dust and vibration free environment. The ambient temperature range should remain between -40°C and +45°C (-40°F and +113°F) for proper operation. Allow at least six inches of clearance around the units to permit an unimpeded access of convection air currents for adequate heat dissipation.

ITEMS FURNISHED

Series 8000 Loads are normally equipped with a "QC" ("Quick-Change") connector for convenient and easy interchange with other AN type "QC" connectors. Model 8431 has an "SQC" ("Small Quick-Change") connector which is not interchangeable with "QC" types. Consult the Specification Sheet, Page vi for the connector type normally supplied with each load.

ITEMS REQUIRED

The only other item required is a matching connector on the coaxial transmission line to which the load will be connected.

TOOLS AND TEST EQUIPMENT

Only simple tools such as screwdrivers will be necessary for exchanging "QC" connectors. None of these loads are subject to any further disassembly. A 1% or better resistance bridge, such as a Leeds and Northrup Model 5305 Test Set, is useful for checking the resistance value of the RF section assembly.

SPECIFICATIONS FOR 8000 SERIES TERMALINE® LOAD RESISTORS

Impedance	50 ohm nominal
Ambient Temperature	-40°C to +45°C (-40°F to +113°F)
Cooling Method	Convection air currents
Operating Position	Any

MODEL	MAX. VSWR	CONNS.	MAX. WATTS	FREQ. MHZ	SIZE	WT. OZ.
8080	1.1 dc-1000 1.25 1000-3500	N-M†	25	dc-3500	5-9/64"L x 1-1/4"Sq	9
8085	1.1 dc-1000 1.25 1000-3500	N-M†	50	dc-3500	5-9/64"L x 1-3/4"Sq	15
8164	1.1 dc-1000 1.2 1000-2500	N-F†	100	dc-2500	6-63/64"L x 2-3/4"Sq	48
8166	1.1 dc-1000 1.2 1000-2500	N-M†	150	dc-2500	7-31/64"L x 4"Sq	96
8173	1.1 dc-1000 1.25 1000-2000	N-F†	300	dc-2000	9"L x 9-9/16"H x 5-1/8"W	100
8431	1.1 dc-1000 1.25 1000-2500	N-F*	500/600	dc-2500	13-7/64"L x 7-1/8"H x 9-1/4"W	206

† "QC" Connector
* "SQC" Connector

SECTION I - INSTALLATION

1-1. LOCATION

1-2. Allow at least six inches of clearance around these units to permit an unimpeded access of convection air currents for adequate heat dissipation. Place the loads to permit the shortest possible cable length between the units and the transmitting equipment.

1-3. GENERAL

1-4. These loads may be used for portable operation or fixed installation. The Models 8080, 8085 and 8164 are, in general, light enough to be attached directly to the mating RF connector of another device such as a Bird THRULINE® Wattmeter or simply set on the workbench like the Models 8166, 8173 and 8431. Attach the load resistor as close as possible to the equipment output and use only good connectors. Try to connect direct to minimize cable length and avoid the use of adaptors as much as possible. The Model 8166, because of its weight, has a provision for special mounting purposes. The housing has four tapped mounting holes on one side. They are 1/2" (13mm) deep for #8-32 screws and arranged in a 6-3/8" x 1-3/4" (162 x 44.4mm) rectangle. Model 8431, mounted horizontally, will dissipate up to 500 watts, mounted vertically, up to 600 watts. Model 8173 should be operated only in the horizontal position.

SECTION II - THEORY OF OPERATION

2-1. GENERAL

2-2. The resistive element in these dry TERMALINE® Loads is individually selected for its accuracy, and enclosed in a heat sink housing. The housing is specially contoured inside to provide the load with its unusually low reflection characteristics throughout its entire frequency range. The housings for the 25, 50, 100 and 150 watt models are deeply slotted and painted lusterless black to improve their heat dissipation. Models 8173 and 8431 are fabricated with sheet metal fins to more efficiently meet their higher heat dissipation requirements.

SECTION III - OPERATING INSTRUCTIONS

3-1. USE AND FUNCTION OF CONTROLS

3-2. These loads, being passive devices have no indicators or operating controls.

3-3. INITIAL ADJUSTMENTS

3-4. No initial adjustments are required.

3-5. START-UP

3-6. Connect these loads to the transmitting equipment under test with 50 ohm coaxial cable where necessary (RG-8A/U, RG-9/U, RG-213/U or equal) equipped with a suitable plug which mates with the RF input connector of the load. After the transmitter has been connected to the load, proceed according to the transmitter manufacturer's instructions. When reconnecting the antenna, it may become necessary to slightly readjust the transmitter due to possible differences in VSWR between the load and the antenna system.

3-7. NORMAL OPERATION

```
************************************************************
*                      C A U T I O N                       *
*                                                          *
* Do not continuously operate these loads above their      *
* maximum wattage levels.                                  *
************************************************************
```

3-8. Having no indicators or operating controls these loads require no special operating procedures or surveillance when the stated performance limits are not exceeded.

3-9. OPERATION UNDER EMERGENCY, ADVERSE OR ABNORMAL CONDITIONS

3-10. These units will sustain an input moderately greater than their maximum rated power for short periods of time. Such loading must be spaced at reasonable intervals to allow sufficient time for cooling to a safe temperature. Apply the excess load for a few minutes at most and allow at least a half hour for adequate cooling before again exceeding the rated maximum load. Because of the excess heat generated by overloading, touch the load with caution under these circumstances to avoid painful burns.

3-11. SHUTDOWN

3-12. These loads, being passive devices, have no way of being turned off. Their source of RF power must be turned off instead.

3-13. EMERGENCY SHUTDOWN

```
**********************************************************
*                      W A R N I N G                     *
*                                                        *
* Never attempt to disconnect the load from the transmis- *
* sion line while RF power is being applied. Leaking RF  *
* energy is definitely a dangerous health hazard.        *
**********************************************************
```

3-14. Turn off the RF power at its source.

SECTION IV MAINTENANCE

4-1. TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE	REMEDY
Excessive Overheating	Transmitter power too high	Reduce transmitter power.
	Faulty RF resistor	Return to factory for repair.
High or Low DC Resistance Values Per Paragraph 4-12	Faulty RF input "QC" connector	Replace.
	Loose "QC" connector	Tighten with a screwdriver.
	Faulty RF resistor	Return to factory for repair.

4-2. CLEANING

4-3. The outside surface of these loads should be wiped free of dust and dirt when necessary. The principle maintenance required by the operator will be to periodically wipe the accumulated dust and lint off of the radiator fins. Excessive collection of dust and lint on the cooling fins will interfere with the efficient dissipation of heat. If the teflon insulator or metallic contact surfaces of the connector should become dirty or grimy, wipe them off with a soft cloth. Use a contact cleaner that is self-drying and nonresidue forming to clean the inaccessible internal parts.

4-4. INSPECTION

4-5. With the rugged and simple construction of the loads, periodic inspection will be necessary only at about six month intervals. Inspection should include the items listed below:

a. Cleanliness - Keep the housing and connector free of grime, see Paragraph 4-3.

b. Inspect the load for completeness and general condition of the equipment.

c. A Troubleshooting Chart, see Paragraph 4-1, lists the commonly encountered problems, their possible causes and remedies. Use this chart as a guide when analyzing symptoms.

4-6. PREVENTIVE MAINTENANCE

4-7. Due to the basic simplicity of construction, the major requirement for preventive maintenance is to keep the equipment clean, particularly the radiator fins. It is important to maintain the heat transfer efficiency of the cooling fins.

4-8. REPAIRS

****
* WARNING *
*
* Do not attempt to remove the RF resistor from inside *
* the load. Potentially toxic materials are used in its *
* construction. *
****

4-9. Due to the unitized nature of the construction of these loads, no repairs in the field are possible other than replacement of the "QC" connector.

4-10. Repairs beyond what is covered in this instruction book will require return of the equipment to Bird Electronic Corporation for service. Please consult the factory.

4-11. CALIBRATION

4-12. DC Resistance - Check the condition of these load resistors by accurate measurement of the dc resistance between the inner and outer conductors of the RF input connector. Use a resistance bridge with an accuracy of 1% or better at 50 ohms, such as a Leeds and Northrup Model 5305 Test Set. The measured resistance should be a nominal 50 ohms. It should not deviate by more than ± 1 ohm from the value on the attached white tag.

4-13. DISASSEMBLY

4-14. Except for the "QC" connector, "SQC" on Model 8431, there is no disassembly possible with these loads. To change the connector use the following procedure.

4-15. RF Connector - The connector is a "QC" design which permits easy interchange with the use of only a screwdriver. This process does not interfere with the essential coaxial continuity of the load resistor RF input. For replacement, proceed as follows:

a. Remove the four #8-32 x 5/16" round head machine screws from the corners of the RF connector.

b. Pull the connector straight out of its socket.

4-16. REASSEMBLY

4-17. RF Connector - To install a new connector, reverse the procedures in Paragraph 4-13, Disassembly. Be sure that the projecting center pin on the connector is carefully engaged and properly seated with the mating socket of the load resistor input.

SECTION V - PREPARATION FOR RESHIPMENT

5-1. GENERAL

5-2. Wrap the RF connector with padding and tape securely in place. Pack and brace the load in a suitable shipping container; a corrugated paper box should suffice.

SECTION VI - STORAGE

6-1. GENERAL

6-2. No special preparations for storage are necessary other than to cover the equipment to keep out dust and dirt. Store these units in a dry and dust-free environment where the ambient temperature will remain within the -40°C to +45°C (-40°F to +113°F) working range of the loads.

SECTION VII - REPLACEMENT PARTS LIST

7-1. GENERAL

7-2. Models 8080, 8085, 8164, 8166 and 8173 use "QC" connectors only.

Available "QC" Type Connectors

N-Female	4240-062	LT-Female	4240-018
N-Male	4240-063	LT-Male	4240-012
HN-Female	4240-268	C-Female	4240-100
HN-Male	4240-278	C-Male	4240-110
LC-Female	4240-031	UHF-Female (SO-239)	4240-050
LC-Male	4240-025	UHF-Male (PL-259)	4240-179
	7/8" EIA Air Line 4240-002		

7-3. Model 8431 uses "SQC" connectors only.

N-Female (small)	4100-014
N-Male (small)	4100-015
UHF-Female (small)	4100-017
SC-Female (small)	4100-021
C-Female (small)	4100-045

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CALORIMETERS

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